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EA-6B Weapons Systems Trainer (WST)  
2F178

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Trainer Description for Device 2F178

Located at

MCAS Iwakuni, Japan

1.1 TRAINER DESCRIPTION

1.1 Function and General Description:

a. The Weapon Systems Trainer (WST) was built by EWA, 6547 South Racine Circle, Suite 1400, Englewood, Colorado. The WST is used for Supporting "Combat Ready" and "Combat Qualification" training for EA-6B squadrons. The trainer is used in the training of pilots, Electronic Counter Measures Officers (ECMO) stations 1, 2, and 3 personnel. The instructor station may be used to represent a ground or ship-based radio operator position. The device is installed in a deployable container capable of housing all other subsystems, being transported intact via a C-5A Galaxy aircraft and able to operate anywhere in the world once electrical power is supplied.

b. The WST includes the following work areas: Program Support Environment, a trainee flight station, trainee tactics station, out-the-window (OTW) visual system, tactics Station IOS, Flight Station IOS, Computer Rack 1 & 2, Control Loader System, digital computer complex with peripherals, Shelter Internal/External, Environmental Control Unit and an uninterruptible power supply (UPS) power system.

c. The trainer simulates the EA-6B Prowler Block 89A ICAP II aircraft systems, OTW visual, Aural system and environmental conditions. It does not incorporate aircraft motion into the simulated experience, oxygen supply system or seat motion. The visual scenes depict terrain in the Far-East area from Iwakuni, Japan to Korea depicting a variety of airfields and their surrounding area, various weather conditions (i.e. clouds, rain, fog, Haze, etc). The scenes are valid through taxi, takeoff, flight, approaches, and landings. Aural effects such as engine noise are also simulated. Instructional features include the capability to operate flight station or tactic station independently or integrated for individual crew training or integrated for crew training. The trainer provides limited flight control for the Tactics Station in the independent mode to perform a tactical mission.

1.2 Trainee Station:

1.2.1 The WST Trainee station is a representative of the EA-6B aircraft cockpit, configured to that of production 89A aircraft configuration. The station provides replication and realistic simulation of EA-6B controls, flight performance, instrumentation symbology, communication and navigation systems, and other cockpit equipment to enable the trainee to perform ground tasks, in flight tasks and maneuvers, response to emergencies, and limited weapons delivery.

1.2.1.1 The Tactics Trainee Station is a representative of the

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EA-6B aircraft positions ECMO station 2 and 3. All instruments, displays, indicators, controls, and switches simulate their counterpart in the basis aircraft in appearance and operation for all tactical jamming and mission modes simulated by this device.

1.2.2 The Flight Trainee Station consists of two (2) basic subsystem elements: (1) the cockpit and (2) the visual display system.

1.2.3 The canopy (No canopy) shall simulate normal and emergency operation of the system. All controls, indicators, instruments and lights associated with the canopy in normal and emergency operations will be provided and will be a replicate of the actual aircraft in function, location and appearance.

1.2.4 The ejection seat performs proper Pilot ejection procedures and causes the simulator perform a "crash" aural cue and enter in a 'Freeze' mode until reset.

1.2.5 The Flight Trainee Station simulates the EA-6B Prowler aircraft through use of the following software/hardware subsystems:

a. Power plant Systems. The Pratt & Whitney J52 P-408 or P-408A turbojet engines of the design basis aircraft are simulated together with the related controls, control and instruments. Static and dynamic engine performance is simulated along with the associated instrument indications, fuel consumption, and sounds.

b. Fuel System. The 2F178 will simulate normal and emergency operation of the fuel supply system. All controls, indicators, instruments and lights associated with the fuel system will operate and will be provided and will replicate the actual aircraft in function, location and appearance. Fuel tank capacity, fuel feed, tank pressure, boost pump and refueling operations will be simulated.

d. Electrical Power System. The 2F178 electrical system will simulate normal and emergency operation of the electric power system. All controls, indicators, instruments and lights associated with the electrical power system in normal and emergency operation and will replicate the actual aircraft in function, location and appearance.

e. Hydraulic Power Supply System. The 2F178 will simulate normal and emergency operation of the hydraulic system. All controls, indicators instruments and lights associated with the hydraulic system in normal and emergency operations will replicate the actual aircraft in function, location, and appearance.

f. Flight Control System. The flight control system will replicate the aircraft behavior and include all primary, secondary and automatic flight controls and the appropriate Stability Augmentation System (SAS). Appearance, displacement and "feel" of the flight controls will be as in the aircraft as defined by the 2F143 baseline.

g. Automatic Flight Control System (AFCS). The 2F178 will simulate normal and emergency operation of the AFCS. All controls, indicators,

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instruments, and lights associated with the AFCS will replicate the actual aircraft in function, location and appearance in both normal and emergency operation.

h. Landing Systems. Simulation of the landing gear, nose-wheel steering, brakes, launch bar, and arresting hook is provided.

i. Wing Fold System. Simulation of the wing fold system is limited to feel and cockpit indication only.

j. Instruments, Indicators, and Displays. Dynamic simulation of the following equipment is provided.

k. Fire Detection/Extinguishing Systems. The fire detection/extinguishing systems are simulated to the extent of cockpit indication and engine performance.

l. Environmental Control System. The 2F178 environmental control system is simulated to the extent of providing conditioned air to the cockpit. The trainee is able to regulate the flow of air to the cockpit and adjust cockpit temperature throughout the range of 65 to 75 degrees F. Air is routed to the cockpit at the same location as in the aircraft.

NOTE: The contractor will be responsible for all Environmental Control System (ECS) equipment that is part of this system which includes the air conditioning equipment.

m. Oxygen System. The 2F178 will simulate normal and emergency operation of the Oxygen System. All controls, indicators, instruments, and lights associated with the AFCS will replicate the actual aircraft in function, location and appearance in both normal and emergency operation.

n. Stores Jettison System. The stores jettison system is simulated to provide jettison of external stores and racks as in the aircraft.

o. Electronic Countermeasures. The 2F178 will simulate the operation of the ALE-47 Electronic Countermeasures system.

1.2.5.1 The Tactics Trainee Station simulates the EA-6B Prowler aircraft through use of the following software/hardware subsystems:

- a. Harm procedures integrated mode.
- b. Emitter analysis and recognition
- c. Jammer assignments
- d. Malfunctions and emergencies
- e. Procedures associated with the Multi-Mission Advanced Tactical Terminal/Integrated Data Modem
- f. Digital Display Indicator (DDI) provides realistic visual representation of selected pages
- g. USQ-113 Improve Operator Control Panel (IOCP) simulates ECM01 position.
- h. Jammer Pod reflects the characteristics of the Universal Exciter Upgrade and various band transmitters.

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- i. Flight controls will have minimal IOS flight controls to support HARM procedures.

1.4 Instructor Stations: The instructor stations are integral with the control station as described below.

1.4.1 FS Control Station. The control station (Instructor/Operator Station (IOS)) provides the instructor/operator with controls to create tactical mission scenarios at the IOS by selecting a gaming area, placing cooperative players, threats and emitters anywhere in the gaming area, assigning waypoints and role models to the players, selecting the initial position, weapon system configuration of the WST, specifying weather conditions for the mission, setting up player flight plans and controlling the scenario.

The tactical mission scenarios will include friendly aircraft that can be programmed to react to wingman, refuelers and independent friendly aircraft.

The instructor shall give control over the mission scenario by being able to choose independent or integrated operation of the FS and TS, freeze and resume mission, insert malfunctions, and stop/replay a mission. The instructor will be able to monitor GCA data and ILS data.

1.4.1.1 Tactical Station IOS. The TS will be a slave to the FS IOS in integrated operation and its own master in independent mode. The instructor will be able to insert malfunctions and provide to the trainee the required HARM Control Panel feedback. TS IOS provide the instructor will all necessary control to perform the missions for ECMO 2 and 3 scenarios.

1.4.2 The principal components of the IOS are:

- a. The IOS shall consist of a touch-screen monitor, keyboard, mouse, communications panel, and headset with microphone.

1.4.3 This concept provides the instructor the means to conduct and monitor the training mission with visual cues analogous to those that are familiar to him in the EA-6B cockpit/tactical stations. Through the utilization of highly integrated controls and displays he can readily follow a logical sequence of events and achieve the interaction necessary to realistically conduct the mission.

#### 1.5 Computer System, Peripherals, and Interface Cabinets

1.5.1 The 2F178 device is a PC controlled trainer using a Silicon Graphics Rack-mounted Onyx 2 computer for visual, and the rack mounted PC's in the below table.

#### Simulation Computers:

Computer	Function	Operating System	Processor

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Computer	Function	Operating System	Processor
<b>Control Loader (ctl_ldr)</b>	<b>Flight Station Control Loader Processing</b>	<b>MS DOS 6.2.2</b>	<b>2 x Pentium MMX 233 MHZ CPUs</b>
<b>Head Down 2 (hd2)</b>	<b>Flight Station DRLMS Processing</b>	<b>Irix 6.5</b>	<b>2 x 225 MHZ R10K CPU</b>
<b>Program Support Environment SGI (pse_sgi)</b>	<b>Program Support Environment</b>	<b>Irix 6.5.6</b>	<b>1 x 300 MHZ R12K CPU</b>
<b>SGI ONYX 2 Out the Window (otw)</b>	<b>Flight Station Aircraft System and Visuals</b>	<b>Irix 6.5</b>	<b>4 x 250 MHZ R10K CPU</b>
<b>Head Down 3 Head Down 8 Flight (L1)</b>	<b>ARC-210 Processing</b>  <b>Fight Station EFIS Processing</b>  <b>Flight Model Processing</b>	<b>Redhat Enterprise Linux 5.5</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Realtime Input/Output Head Down 1 Head Down 7 (L2)</b>	<b>Flight Station and Tactics Station I/O System and Network Controller</b>  <b>Flight Station and Tactics Station V/UHF Repeaters</b>  <b>Tactics Station Aircraft Systems Processing</b>	<b>Redhat Enterprise Linux 5.5</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Head Down 5 Head Down 6 (X1)</b>	<b>Tactics Station DDI Processing</b>  <b>Tactics Station Video Scope Processing</b>	<b>Win XP SP3</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Flight Station Instructor Operator Station (X2)</b>	<b>Flight Station Instructor Station</b>  <b>CXP AIC-45 Flight Station CDU</b>	<b>Win XP SP3</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Tactics Station Instructor Operation Station (X3)</b>	<b>Tactics Station Instructor Station</b>	<b>Win XP SP3</b>	<b>Intel Quad Core Xeon CPU</b>

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Computer	Function	Operating System	Processor
<b>Improved Operator Control Panel (iopc) (X4)</b>	<b>Improved Operator Control Panel</b> <b>USQ-113 Processing</b>	<b>Win XP SP3</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Program Support Environment PC (pse_pc)</b>	<b>Program Support Environment</b>	<b>Win XP SP3</b> <b>Redhat Enterprise Linux 5.5</b>	<b>Intel Quad Core Xeon CPU</b>
<b>Program Support Environment PC (pse_pc2)</b>	<b>Additional Program Support Environment</b>	<b>Win XP SP3</b> <b>Redhat Enterprise Linux 5.5</b>	<b>Intel Quad Core Xeon CPU</b>

## 1.6 Aircraft Common Equipment (ACE)--N/A

## 1.7 Power System

1.7.1 The trainer power system controls and distributes AC and DC power throughout the trainer. The system requires 208VAC three-phase (125 amps per phase) 5 wire, 50/60 Hertz, 400 amp service.

1.7.2 The trainer power will be filtered through an Uninterruptible Power Supply (UPS) with sufficient battery back-up power to allow for a systematic shutdown during power outages. The UPS will allow for twenty (20) minutes of available power at maximum system draw.

## 1.8 Visual System.

1.8.1 The visual subsystem provides an out-the-window (OTW) real-world representation for the trainee through the use of Image Generation System (IGS) provided by Silicon Graphics, Infinite Reality rack computer system with four 250 MHz R10000 CPUs, 512 Mbytes of memory, two Infinite Reality Graphic Pipes, four 64Mb Raster Managers and two 2-channel Display Generators. The display will be via four (4) Barco™ G808S Rear Screen Projectors (Retrobloc-L) and collimated optics. The visual display will give a fully correlated out-the-window visual display system supporting all aspects including all-weather, day-night-dusk, weapons effects, fog, smoke and haze.

## 1.9 Motion System--N/A

1.10 Air Conditioning System: A stand-alone air conditioning/heating system is provided within the trainer container.

## 1.11 Motor Generator Sets: N/A

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1.12 Hydraulic System: N/A

1.13 Enclosure:

1.13.1 Device 2F172 is a Mobile Enclosure System Training Device that is designed for use in various locations. The enclosure used is referred to as the Device Shelter. The shelter provides for optimal operating environment and for the various equipment that makes up the Training Device and personnel. The shelter is designed to be deployable and to be placed on a level concrete pad.

The shelter is fully transportable and designed for fixed operation at various locations. It is equipped with controls, devices, instruments and environmental protection to ensure maximum safety and survivability. The device shelter features certain transport and installation characteristics inherent in the shelter design. Overall dimensions allow for transport by air, land and sea. For shelter leading particulars refer to Installation Manual.



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## 2.1 Illustrations:

Complete lists of illustrations are available at each training device location.

## 3.1 Mission Essential Subsystem Matrix (MESM): Not Applicable

## 4.1 CONTRACTED TRAINING TIME (CTT)

Training Operations shall be provided in each FY as per exercised contract CLIN/SLIN from one of the stair steps below:

<b>2F178-1 EA6B WST</b> <b>Contracted Training Time (CTT) Monday thru Friday (M-F)</b> <b>MCAS Iwakuni, Japan</b>			
<b>Hours per Day (HPD)</b>	<b>Hours per Week (HPW)</b>	<b>Start Time (local) (Notional)</b>	<b>End Time (local) (Notional)</b>
2	10	1000	1200
4	20	0800	1200
6	30	0800	1400
<b>Remark(s) / Note(s)</b>			
1-CTT time represents continuous hours of device operational training availability from initial START time. 2-CTT does not include weekend (Saturdays/Sundays) training, and no weekend training planned. 3-CTT daily Start Times are notional and may vary/shift with coordination and direction from the Contracting Officer's Representative (COR)/site scheduling authority and may change during the course of the Task Order. (Refer to Addendum A, paragraph 4.3.1). 4-CTT may be shifted between devices with coordination and direction from the Contracting Officer's Representative (COR) and Contractor Site Manager. 5- To facilitate compressed work weeks (less than five (5) training days), due to site schedules, the Government may exceed the device daily HPD requirement up to a maximum of (8) HPD, not-to-exceed (NTE) the contracted HPW, without incurring Premium Time (PT) requirements, and only with prior COR and Site Manager coordination. (Refer to Addendum A paragraph 4.1.3.4, Premium Time)			
<b>Table 4.1</b>			

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5.1 Aircraft Common Equipment (ACE)

Complete list of ACE can be found in the inventory list provided at each site.

The Material Support Package (MSP) inventory of this solicitation will be determined by the results of CDRL A005 "COMS/CMS CONTRACTOR INVENTORY/UTILIZATION REPORT OF GFP/GFI". The results of the transition inventory will be verified and signed by the site COR prior to Contractor's submission of CDRL A002 to the Government.

NOTE: Whenever minor configuration changes, calibration or adjustment of aircraft common equipment is required for use in the trainer; such information shall be provided in this Appendix.

5.2 Trainer Equipment. Depot level (D-level) maintenance for the following trainer equipment is the responsibility of the government.

Complete list of D-level trainer equipment will be provided at each site.

5.2.1 Trainer Support Package (TSP): Includes Tools/Support Equipment, Spare Parts, Technical Data Support Package, and Software Support Material. The formal inventory (i.e. tools/support equipment, spare parts, technical data support package, and software support material, etc.) shall be those items identified during the mobilization period and stated in the yearly Inventory/Utilization Data Report. The Contractor shall comply with the development, maintenance and submission requirements for this report, as stated in the applicable CDRL item."

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## 6.1 PARTIAL MISSION CAPABILITY (PMC) STANDARD

**NOTE:** PMC is the material condition of a training device that cannot perform all of its missions.

PMC LISTING  
DEVICE 2F178 WST

**I. Major Equipment**

FAILED EQUIPMENT	UNIT	INDEP. EOC	DEGRAD. FLT	INTEGR. EOC	DEGRAD WST
AC Dist. Cabinet Mod	8	J	50	J	100
DC Dist. Cabinet	9	J	50	J	100
COMM/NAV Cabinet	10	J	50	J	100
Intelligent I/O Cabinet	11	J	50	J	100
Digital I/O Cabinet	12	J	50	J	100
Trainee Station	47	J	50	J	100
IOS Console	50	J	50	J	100
Radar Repeater Console	51	C	10	C	10
IOS Console	52	G	50	G	50
Visual Image Generator	58	G	50	G	100
Air Conditioner	61	G	50	G	100
Table Mod	71	D	20	D	20
Laser Printer	77	D	20	D	20

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PMC Standard Device 2F178 (Cont)

**II. Trainee Station****FAILED EQUIPMENT**

	<b>INDEP.</b>	<b>DEGRAD.</b>	<b>INTEGR.</b>	<b>DEGRAD.</b>
	<b>EOC</b>	<b>FLT</b>	<b>EOC</b>	<b>WST</b>
ACLS Mode I	E	30	E	30
Pilots PHD	F	40	F	40
Radar DRLMS	J	50	J	80
ACLS Mode II	E	30	E	30
CDI	H	50	J	100
Snap/reset	H	50	H	60
Visual System	J	50	J	100
Flight Cont. System	J	50	J	100
EADI	H	50	H	60
ARI	H	50	H	60
Altimeter	H	50	H	60
Airspeed Indicator	H	50	H	60
EHSI	H	50	H	60
EFIS Cont. Panel	H	50	H	60
Radar Altimeter	E	40	F	40
Engine Instruments RPM, EGT, Fuel Flow	H	50	G	60
Hydraulic Sys. Ind.	H	50	G	60
Caution Warning Lights	J	50	J	80
Engine Noise	H	50	G	60
CDNU	J	50	G	60
Cockpit Enviro.	J	50	J	100
AOA System	H	50	H	60
Int. Position Ind.	H	50	H	60
Fuel Management Pnl	H	50	H	60
Generator Cont. Pnl	H	50	H	60
Circuit Breaker(s)	H	50	H	60
ICS System	J	50	J	80
UHF 1 or 2	J	50	J	80
HF	J	50	J	80
TACAN	J	50	H	60

**III. Instructor Station****Failed Equipment**

	<b>Indep.</b>	<b>DEGRAD.</b>	<b>Integr.</b>	<b>DEGRAD.</b>
	<b>EOC</b>	<b>FLT</b>	<b>EOC</b>	<b>WST</b>
IOS #1 CRT	G	50	G	50
IOS #1 Keyboard	D	20	D	20
IOS #1 ICS/Radio Cntrl	G	50	G	50
IOS #2 Keyboard	D	20	D	20
IOS #2 ICS/Radio Control	G	50	G	50
IOS #2 Touch Panel	D	20	D	20
Console Visual Display	G	50	G	50
Snap/reset	D	20	D	20
Operate Mode Flt Only	J	50	J	100
Device Operator	J	50	J	100
WST Mode	B	0	J	100

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## 6.2 ESSENTIAL SUBSYSTEMS/CONDITION REQUIRED FOR TRAINING EVENTS

## IV. TS IOS Trainee Station

## FAILED EQUIPMENT

	INDEP.	DEGRAD.	INTEGR.	DEGRAD.
	EOC	TAC	EOC	WST
Pressure Altimeter	C	10	C	10
Cabin Press. Alt.	C	10	C	10
Altitude Reference Indicator	C	20	C	20
Eight Day Clock	E	30	E	30
Airspeed Indicator	D	10	D	20
Indicator Light Panel (E-2 or E-3)	C	10	C	10
Indicator Light Panel (E-2 & E-3)	C	10	C	10
Master Light Test (E-2 or E-3)	C	10	C	10
Master Light Test (E-2 & E-3)	C	10	C	10
DDI (E-2 or E-3)	H	50	H	60
DDI (E-2 & E-3)	J	50	J	100
DDIC (E-2 or E-3)	H	50	H	60
DDIC (E-2 & E-3)	J	50	J	100
Signal Light (E-2 or E-3)	C	10	C	10
Signal Light (E-2 & E-3)	C	10	C	10
BDHI and Control (E-2 or E-3)	D	20	D	20
BDHI and Control (E-2 & E-3)	F	40	F	40
Warning Lights Panel	J	50	J	100
Jammer POD Cont. Box	J	50	J	100
Audio (E-2 or E-3)	H	50	J	100
Audio (E-2 & E-3)	J	50	J	100
Video (E-2 or E-3)	G	50	G	50
Video (E-2 & E-3)	G	50	J	70
OBS/TJS Master Control	J	50	J	100
RRS	J	50	J	100
Radio Control Panel (E-2 or E-3)	G	50	G	50
Radio Control Panel Integrated	J	50	J	100
ICS Control Panel (E-2 or E-3)	G	50	G	50
ICS Control Panel Integrated	J	50	J	100
AYK-14 Computer	J	50	J	100
ASN-123	J	50	J	100
1553 Data Bus	J	50	J	100
Harm 3/4	F	40	F	40